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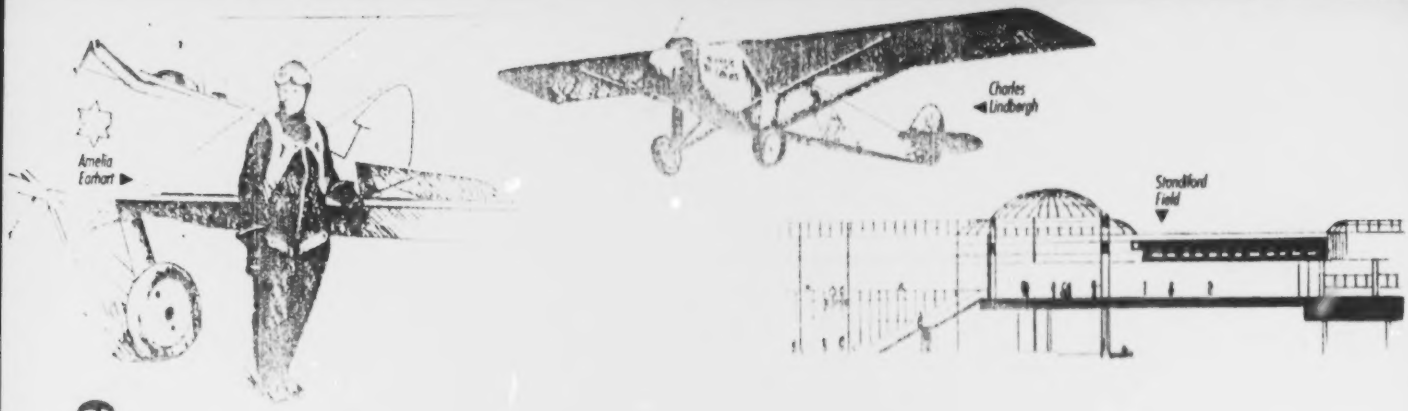
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ABSTRACT

These lesson plans are designed for use by high school social studies teachers who take their students on a field trip to the regional airports of Louisville, Kentucky. Twelve lesson plans are included: "It's the Computer's Fault"; "The Play's the Thing"; "A Hub! Yes, There's the Rub!"; "People and Inventions"; "If You Deregulate, Does That Mean It Isn't Regular?"; "Landmark Events"; "Future Studies"; "Getting from Here to There"; "Time Zones"; "It's a Job"; "Future Flyers"; and "Tracing Change." Each lesson includes the following information for teachers: title, grade level, skills, performance objectives, materials, and procedures. A bibliography is provided along with an appendix that lists organizations from which educational resources concerning aviation and aerospace are available. (DB)

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High School Social Studies Lessons

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REGIONAL AIRPORT AUTHORITY
LOUISVILLE AND JEFFERSON COUNTY

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Frank DeSensi
Educational Consultant

Susan Rostov
Project Coordinator

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LESSON TITLE: **IT'S THE COMPUTER'S FAULT!**

GRADE LEVEL: Science, U.S. History, Computer Science

SKILLS:

- Identifies technological changes
- Conducts research on the impact of change
- Identifies the importance of technology on air and travel industries

PERFORMANCE OBJECTIVES:

- The student will identify computer uses.
- The student will examine the impact of computers on air travel.
- The student will report findings to the class.

MATERIALS:

Airport materials--e.g., career information, different parts of an airport
Library resources
Guest speakers
Airport tour materials

PROCEDURE:

1. Discuss the impact computers have had on society/on education. Note that technological changes impact on every facet of an industry.

2. Review the parts of an airport--e.g., hangar, control tower, apron, runway, terminal. Note that each part has been affected by the computer.

3. Divide the class into groups, and have each group take one part of an airport. Examine the impact computers have had on that area. Have each group report back to the class.

4. A tour of the airport with or without interviews can allow the students to assess how computers are used at the airport.

LESSON TITLE: **THE PLAY'S THE THING.**

GRADE LEVEL: Language Arts, Social Studies, Sciences

SKILLS:

- Identifies historical mysteries
- Creates imaginative answers for unanswered historical questions
- Dramatizes events

PERFORMANCE OBJECTIVES:

- The student will conduct research on a historical "mystery".
- The student will write a one act play dramatizing what the student concludes might have happened.

MATERIALS:

Library resources
Guest expert (if available)

PROCEDURE:

1. Ask the class what happened to Amelia Earhart or to the fighter squadron that vanished in the Bermuda Triangle. News articles can be used on the latter.

2. Divide the class into production groups, and have each pick a "mystery"---e.g., What happened to Amelia Earhart? What happened to Will Rogers? What happened to the Fighters?

3. Have each group research the event, and write a one act play solving the mystery. Groups can then present or read their plays to the rest of the class.

LESSON TITLE: **A HUB! YES, THERE'S THE RUB!**

GRADE LEVEL: Geography, World History, U.S. History, Economics

SKILLS:

- Locates places on maps
- Relates written material to maps
- Uses maps to visualize concepts

PERFORMANCE OBJECTIVES:

- The student will define airline "hub".
- The student will locate "hubs" that serve Standiford Field or are served by Standiford Field.
- The student will illustrate an airline "network".

MATERIALS:

Airline schedules/literature
World map/U.S. map
Yarn
Pins

PROCEDURE:

1. Establish that Louisville is a regional airport and what that means to areas served by and areas serving Standiford Field.

2. Divide the class into groups, and give each group an airline that uses Standiford Field: Midway, American Airlines, U.S. Air, United Airlines, T.W.A., Continental, Northwest, Skyway, Air Toronto, Comair, Delta. Have each group gather literature on the airline, and determine local, national and international routes. Give each group a different color yarn, and have them locate the routes on the U.S./world maps.

3. Which airline(s) offer the most destinations? Which focus on local, national or international travel? Which use the most intermediate hubs?

LESSON TITLE: **PEOPLE AND INVENTIONS**

GRADE LEVEL: U.S. History, World History, Science, Physics

SKILLS:

- Describe the contributions of people to a technological theme
- Conducts research on personalities in history
- Records data on a Directed Writing Work Sheet
- Presents finding to the class

PERFORMANCE OBJECTIVES:

- The student will select one personality from the Aeronautical Pioneer List and investigate to determine his/her contributions.
- The student will use the Directed Writing Form to organize data.
- The student will present his/her findings to the class.

MATERIALS:

Aeronautical Pioneer List
Directed Writing Work Sheet
Library Materials

PROCEDURE:

1. Discuss the idea of personality and history. Brainstorm with the class to generate a list of personalities. Then group the names according to area of contribution---e.g., politics, music.

2. Distribute the Directed Writing Work Sheet and the Aeronautical Pioneers List. Have the students, individually or in groups, select one pioneer. Conduct research to determine his/her role/contributions to the field of Aeronautics and present the findings to the class.

3. This activity can be extended:

- Have the students design a retrieval chart that they can use to record the data presented by other groups in class.

- Have the students complete Data Cards and use them to annotate a thematic time line. (See Time Line Activity.)

- Use the same form to study another set of innovations---e.g., laws of

physics, art, music, politics.

- Have the class start a Technology Hall of Fame and nominate two innovators for membership. Continue adding members as other units are studied.

DIRECTED WRITING WORKSHEET

Personality _____ **Dates** _____

Background: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

Contributions/
Achievements: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

AERONAUTICAL PIONEERS

Jeanne Holm
Ferdinand Von Zepplin
Leonardo da Vinci
Archytas
Giovanni Borelli
Sir George Cayley
Otto Lilienthal
Octave Chanute
Orville/William Wright
John Stringfellow
Clement Ader
Sir Hiram Maxim
Samuel Langley
Trajan Vuia
Louis Bieriot
Igor Sikorsky
Alberto Santos-Dumont
Glenn Curtiss
Anthony Fokker
Tony Jannus
Richard Byrd
Charles Lindbergh
Amelia Earhart
Charles Yeager
Henri Giffard
William Henson
Robert Stanley
Robert Goddard
Wernher Von Braun
Yury Gagarin
John Glenn
Neil Armstrong
Howard Hughes

LESSON TITLE: **IF YOU DEREGULATE, DOES THAT MEAN IT ISN'T REGULAR?**

GRADE LEVEL: U.S. History

SKILLS:

- Relates events to causes and effects
- Conducts research on an assigned topic
- Identifies federal agencies and their roles
- Uses criteria to evaluate successful programs

PERFORMANCE OBJECTIVES:

- The student will trace the growth of federal regulation of aviation.
- The student will trace the deregulation of aviation.
- The student will assess the success of deregulation.

MATERIALS:

Library resources
Guest speaker/resource person

PROCEDURE:

1. Ask the class how safe it is to fly. Note that the government has alternately regulated and deregulated air travel in an effort to promote both safety and efficiency.

2. Note that anytime a governmental action is studied, a variety of perspectives can be used. Look at a basketball game from the perspective of a coach, a cheerleader, a referee and a sports writer. How do the perspectives differ? Apply this to governmental action. (e.g., historian's, political scientist's)

3. Divide the class into five groups. Have each group research the federal regulation of aviation and report back to the class focusing on one perspective.

   A. Historian - Trace the efforts to regulate/establish agencies.
   B. Historian - Trace the efforts to deregulate aviation/dismantle federal agencies.
   C. Political Scientist - How successful has deregulation been? (pluses and minuses)
   D. Political Scientist - How do other countries regulate their air

travel?
E. Economist - Who benefits (in theory, in practice) from deregulation?

LESSON TITLE: **LANDMARK EVENTS**

GRADE LEVEL: U.S. History, World Civilization

SKILLS:

- Defines and identifies landmark events
- Establishes criteria for judging events
- Locates and records data on events
- Presents conclusions

PERFORMANCE OBJECTIVES:

- The student will define and give examples of "landmark events".
- The student will analyze events and determine those that are labeled "landmarks".
- The student will present conclusions to the class.

MATERIALS:

Encyclopedia
Standiford/Bowman Field Landmark Events List
Class Time Line
Event Data Card for Time Line
Pins or Tape
Yarn
Landmark Events List - Airline/Flight
Event Data Sheet

PROCEDURE:

1. Create a time line on a wall or bulletin board for the period covered by the course. Note what can go on a time line (events, life times, periods). Describe the ways information can be displayed on a time line (e.g., simple chronology, thematic, annotated).

2. Distribute the Standiford - Field/Bowman Field Events List. Fill out a data card on each event, and connect the card/event to the time line by connecting the card to the correct date with the yarn. This creates an annotated, thematic time line on Jefferson County air fields.

3. Distribute one of the other chronologies (or create one), the Event Data Sheets, and the Data Cards. Have the students pick or assign an event to each student. Have them investigate the event, complete the data sheet, complete a data card, and attach the data card to the appropriate date on the time line.

Note, if more than one theme is used, data cards can be "color keyed" to provide a visual "theme" comparison.

4. This activity can be a cumulative activity, continued all year as the appropriate period is studied, or it can be completed as one activity.

Company Profile: REGIONAL AIRPORT AUTHORITY OF
LOUISVILLE & JEFFERSON COUNTY
Standiford Field
P. O. Box 9129
Louisville, Kentucky 40209-9129
(502) 368-6524

Chief Officer: Robert S. Michael
General Manager

The Regional Airport Authority of Louisville and Jefferson County is an independent public agency, established by a special act of the State Legislature in 1928. It operates both Standiford and Bowman Fields in Louisville. An eleven-member Board, appointed by the Mayor of Louisville, the Jefferson County Judge/Executive and the Governor, make major decisions by setting Authority policy. The Board members serve without pay.

Board policies are implemented and day-to-day operations and maintenance handled by a staff of about 142 under the direction of the General Manager.

Some of the jobs performed by the Airport Authority staff are:

Airfield, electrical, structural and heating, plumbing and air-conditioning - also vehicle maintenance
Airport Rescue Fire Fighting
Security and communications
Engineering, drafting and survey work
Construction inspection
Accounting and bookkeeping
Contract and lease preparation
Air Service development and promotion
Purchasing
Personnel and employee program management
Public relations
Marketing
Information Specialists
Secretarial

The Airport Authority has nothing to do with the everyday operations of the individual airlines. Each of them is operated separately by airline management and other personnel. The airlines, along with other companies and agencies, lease space from the Airport Authority to conduct business at the airports.

Although the airlines' employees get special discounts and privileges when traveling by air, Airport Authority employees do not. The Airport Authority does not own any aircraft. Airplanes are owned by the airlines, flying services or private individuals who use airport facilities.

The Authority's annual budget is $16.6 million. Income for operation of the airports is derived from landing and field use fees, ground transportation and lease revenue; the Authority does not receive tax dollars to support the facility. Through the operation of the airports, it is estimated that airport employees contribute over $13.9 million in State and local taxes.

The Authority has received tremendous support by the federal government in grant money for the improvement of facilities at both Standiford and Bowman Fields. In the 1988 and 1989 fiscal years, over $10 million was awarded toward the completion of Standiford Field projects, to include taxiway and apron construction and airport Rescue service needs.

In 1988, the Authority announced plans to improve Standiford Field through the expansion to a parallel runway system. This expansion will provide an estimated 27,000 additional jobs for the community and have an economic benefit estimated at over $40 million in taxes alone by 2010. Expansion of the airport will allow the addition of improved service, greater efficiency in airline operations and improved economic viability.

Bowman Field

* Named for A. H. Bowman, an aviation pioneer, who formed the first flying service on the airfield.
* Operated as the only airport serving Louisville from 1918 through 1947 with service by Trans World Airlines, American Airlines and Eastern Air Lines initiating in 1928.
* First paved runway built in 1938, now a network of three runways and nine taxiways complete with lights and navigational aids are in use.
* Military groups have been stationed at the airport since 1922 when the Air Corp Reserve group arrived. In the 1940s, the Glider Pilot Combat Training and a nurses training school established operation relative to World War II needs and at present the United States Army Reserve is based at the airport.
* During World War II, Bowman was considered the busiest airport in the country and today remains the busiest airport in Kentucky with over 190,000 aircraft operations annually.
* Today a multitude of services are available with flight instruction, aircraft charter and aircraft repair as just a few.

Standiford Field

* Named for Dr. Elisha David Standiford, a former president of the L&N Railroad, who owned a portion of the original airport acreage.
* Serves commercial, military, air cargo and general aviation aircraft.
* Opened in 1947 to handle air carrier service, today served by ten airlines with over 80 commercial flights daily and over two million passengers served annually.
* Standiford has experienced tremendous growth and improvement over the years such as:

  - 1950 Lee Terminal constructed
  - 1969 First cargo facility completed
  - 1971 Lee Terminal expanded
  - 1973 FAA Air Traffic Control Tower opened
  - 1981 FAA Airway Facilities Sector Field Office and National Weather Service facility opened
  - 1982 United Parcel Service began operation
  - 1983 10,000 ft. runway completed
  - 1984 Second cargo facility constructed
  - 1985 Landside Terminal and parking lot/roadway system completed
  - 1989 Airside Terminal completed

* The passenger terminals comprise over 225,000 sq. ft. and are designed to accommodate anticipated growth well into the next century.
* The airport consists of two runways and fifteen taxiways and handles over 150,000 operations a year, the airport currently ranks ninth in the world and fifth in the U.S. in the total amount of cargo handled.

LANDMARK EVENTS - STANDIFORD FIELD/BOWMAN FIELD

1928	Louisville and Jefferson County Air Board established; first approved by any state to govern airports
1928	Airline service begins at Bowman Field (Continental Airways)
1929	Bowman Field Administration Building completed
1938	Concrete runways replace grass at Bowman Field
1940	Land purchased for auxiliary airport off Preston Street Road
1941	Standiford Field opened; used for military testing
1943	Bowman Field expanded; serves glider/base for military
1947	Commercial airlines move to Standiford Field
1950	Lee Terminal opens; serves American, Eastern, T.W.A. and Piedmont
1959	Terminal at Standiford Field expanded; serves seven airlines
1971	Standiford Field again expanded; F.A.A. control tower added
1975	Bowman Field expanded/modernized
1968 - 1978	Standiford Field renovated/expanded with new runways
1982	United Parcel Service operates hub at Standiford Field
1988	Effort to expand/modernize Standiford Field begins

LANDMARK EVENTS - AIRLINE

1910	First commercial airline organized in Germany
1914	First regularly scheduled airline service in U.S. (St. Petersburg to Tampa)
1919	First regular international service (London to Paris)
1930	Trans World Airlines begins transcontinental service (36 hours)
1936	United Airlines sets up kitchens for serving meals in flight
1939	Civil Aeronautics Board created
1939	First regular trans Atlantic flights (Pan American)
1946	Around the world passenger service begins
1952	Jet airlines used in regular service (British Airways)
1958	First U.S. jet airline services (National Airlines)
1976	First supersonic airlines (Air France and British Airways)
1978	Air travel deregulated by Congress
1984	Civil Aeronautics Board dissolved

LANDMARK EVENTS - FLIGHT

400 B.C.	Archytas builds wooden pigeon
400 B.C.	Chinese begin making kites
1500	Leonardo da Vinci designs an "ornithoptea" and a parachute
1783	Jean Pilatre de Rozier - first free flight (balloon)
1809	Sir George Cayley builds first successful glider
1843	William Henson patented first airplane
1860's	Balloons used as observation decks by military
1896	Otto Lilienthal makes first manned glider flight
1896	Samuel Langley flies a steam powered model plane
1903	Wright brothers make first powered heavier-than-air plane

(Students can complete this list by locating and describing landmark events.)

EVENTS DATA SHEET

EVENT_____ **DATE**_____

PERSON(S) INVOLVED_____

SUMMARY OF EVENT_____

IMPORTANCE_____

PICTURE(S)

EVENT DATA CARD FOR TIME LINE

Event:_____ **Date**_____

Summary_____

_____

_____

_____

_____

_____

Why should it be considered a landmark?_____

_____

_____

_____

_____

LESSON TITLE: **FUTURE STUDIES**

GRADE LEVEL: Geography, U.S. History

SKILLS:

- Makes speculations on future developments
- Presents conclusions

PERFORMANCE OBJECTIVES:

- The student will analyze community developments.
- The student will project airport needs for the year 2050.
- The student will develop a plan for "Airport 2050".
- The student will present plans to the class.

MATERIALS:

Encyclopedia
Strategic Planning Prompt Sheet
Airport Materials (e.g., ten year plan, summary, annual report)

PROCEDURE:

1. Introduce the idea of updating institutions. The Communist Party in Russia or the airport expansion are good examples.

2. Ask the students to imagine Jefferson County in the year 2050. Discuss what will be different. Ask what type of airport will be needed.

3. Distribute the Strategic Planning Prompt Sheet. Discuss the Sheet, and ask the students, individually or in groups, to design an airport for 2050.

4. Have the students report on their plans to the rest of the class or to an airport expert. Discuss the plans, and select the best plan justifying that decision.

STRATEGIC PLANNING PROJECT SHEET

AIRCRAFT	What types will use the airport? What types of facilities will be needed? What safety considerations will be important? Will the airport have to expand?
COMMUNITY	How many people will be in the "community" that the airport serves? What air services will the community need? What new services will be needed? How will business interact with the new airport? Will air travel increase or decrease?
TECHNOLOGY	What new technologies will compete with today's aircraft? How will computers be used in the new airports? Will robotics be important?
DESTINATIONS	What destinations will be available from the new airport? Will Standiford Field provide a direct link or will it be dependent on another hub? Will other transportation forms compete for travel to certain destinations?
TRAVEL	Will air travel change for the traveler? How will safety and comfort compare to travel today? What services will be needed by travelers and how will they be supplied? How fast will travelers move? Is there a natural limit?
AIRPORT	How will it have to change? How big will it have to be? What new features will have to be included? How will automation be included?

LESSON TITLE: **GETTING FROM HERE TO THERE.**

GRADE LEVEL: World Geography, World History, Earth Science

SKILLS:

- Locates places on maps
- Makes action plans
- Conducts research on assigned topics

PERFORMANCE OBJECTIVES:

- The student will locate places on a map.
- The student will plan a visit to a selected location.
- The student will present his/her travel plans to the class.

MATERIALS:

Airline Charts
Destination Suggestions
Daily Travel Itinerary Sheet

PROCEDURE:

1. Select one place important to the unit of study, and ask where it is and how one would get there.

2. Using one of the destinations on the Destinations List, have the students select a destination and plan a trip to that place.

   - Plan travel arrangements (e.g., airlines, flight time, cost, changes of aircraft, if any, airport destinations).
   - Discuss travel needs (e.g., clothes, food, medicine, passport or visa).
   - Discuss reasons for visiting/sites/sporting events/museums. Generate a list.
   - Discuss conditions in a vacation area (e.g., language, currency, religion, population).
   - Have each student prepare a two to ten day itinerary for the trip using the Daily Travel Itinerary Sheet.

3. The activity can be extended by:
   - having the students create a retrieval chart on all destinations

DAILY TRAVEL ININERARY SHEET

DAY _____

TIME	SITE/EVENT	NOTES/COST/SPECIAL CONDITIONS
A.M.		
8		
9		
10		
11		
12		
P.M.		
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

DESTINATION SUGGESTIONS

Vacation

Barcelona
Rome
Tokyo
Paris
Buenos Aires
Mexico City
Beijing
Jerusalem
Cairo
Cape Town
Zimbabwe
Manila
Hong Kong
Aruba
Boston
London
Stockholm
Moscow
Calcutta
Kabul
Quebec
Juneau
Rio de Janeiro

Natural Features

Grand Canyon
Niagara Falls
Mount Vesuvius
Amazon Basin
Olduvai Gorge
Angel Falls
Lake Baikal
Matterhorn
Mount Kilimanjaro
Mount Everest
Ross Ice Shelf
Bering Straits
Sitka Sound
Chesapeake Bay
Truk Island
Florida Keys
Gobi Desert
Sahara Desert

Historic Features

Eiffel Tower
Sears Building
Taj Mahal
Forbidden City
Panama Canal
Suez Canal
Wailing Wall
Kaaba
Three Mile Island
Chernobyl
Notre Dame de Paris
Chichen Itza
Pyramids of Mexico
Big Ben
Golden Gate Bridge
Pyramids of Egypt
Alamo
Vatican
Louvre
Acropolis
Parliament

LESSON TITLE: TIME ZONES

GRADE LEVEL: U.S. History, World Geography, Earth Sciences

SKILLS:

- Locates places on a map
- Associates data from different map forms
- Locates places in time zones
- Relates math skills to content area problems

PERFORMANCE OBJECTIVES:

- The student will define time zones.
- The student will locate time zones on a map.
- The student will relate places to time zones.

MATERIALS:

Time Zone Worksheet
World Map with Time Zones
Scrap Paper
Distance Chart

PROCEDURE:

1. Discuss an event of interest to the students---e.g., Iraq war, Wimbledon, World Series. Ask, what time it was shown on T.V.? What time was it at the event site? Introduce the idea of time zones.

2. Provide each student with a map of time zones and Time Zones Work Sheet. Have them, individually or in groups, complete the work sheet.

3. Once the sheets have been completed, discuss what this means to travelers/news people---e.g., story deadlines, jet lag, scheduling.

TIME ZONE WORKSHEET

Where does the day "begin?" _____

How many time zones are there? _____

How large is a time zone? _____

How many time zones are found in the U.S.? _____

Name the time zone for the following locations:

Vladivostok _____
Beijing _____
Moscow _____
Berlin _____
London _____
Quebec _____
Chicago _____
San Francisco _____
Honolulu _____

Which country crosses the most time zones? _____

In which time zone is Louisville? _____

If it is 1:00 P.M. in Louisville, what time is it in

Manila? _____
London? _____
Moscow? _____
New York? _____
Nashville? _____
Berlin? _____
Honolulu? _____
Beijing? _____
Tel Aviv? _____
Paris? _____

DISTANCE CHART

Assuming a flying speed of 500 miles per hour, what time will it be in _____ if the plane leaves Louisville at 1:00 P.M. E.S.T.?

DESTINATION	DISTANCE	ARRIVAL TIME
New York		
San Francisco		
London		
Vienna		
Jerusalem		
Moscow		
Honolulu		
Lima		
Hong Kong		
Tokyo		

LESSON TITLE: IT'S A JOB!

GRADE LEVEL: Home Economics, U.S. History

SKILLS:

- Identify career opportunities in an industry
- Research career options
- Describe career options to others

PERFORMANCE OBJECTIVES:

- The student will identify careers available in the field of aviation.
- The student will study career options and determine required training, opportunities, pay and job-related problems.
- The student will report to class on his/her career study.

MATERIALS:

Aviation materials (Aviation Careers)
Guest speakers
Library resources

PROCEDURE:

1. Point out how/why you decided to become a teacher. Note training needed, career opportunities in education, pay and job-related problems. Note that every industry has career options. Establish the aviation industry as an example.

2. Brainstorm with the class to generate a list of aviation-related careers.

3. Have each student report back to the class on his/her career. Have each explain how his/her classes help prepare for the career.

4. This activity can be extended by:
   - having students design a retrieval chart to organize data presented on different careers;
   - inviting guest speakers on selected careers to talk about the "real world" as they see it;
   - sponsoring an air travel career fair for the school with information booths for the different careers.

LESSON TITLE: **FUTURE FLYERS**

GRADE LEVEL: All courses

SKILLS:

- Relates learning to activity/careers
- Identifies training for a career choice in flying

PERFORMANCE OBJECTIVES:

- The student will identify the training requirements to receive an aviation license.
- The student will relate current learning to aviation training.
- The student will differentiate between ground school and flight training.

MATERIALS:

Ground school materials (available from several sources)
Interest inventions
Guest speakers

PROCEDURE:

1. Ask the class how many would like to fly an airplane. Have some of the students conduct an interest inventory to determine how many students are interested in aviation.

2. Set up a "future flyers" p.m. activity. This can involve building equipment, operating a weather station, building and testing models, studying ground school topics, listening to guest speakers, visiting an airport, flying school, or traveling to an air museum.

3. Students involved should note how many of the activities relate to subjects studied in school and serve as resources to those classes.

4. Students involved should study aviation careers and examine career objectives.

LESSON TITLE: **TRACING CHANGE**

GRADE LEVEL: Science, U.S. History, World Civilization, Physics

SKILLS:

- Describes change in aircraft technology
- Identifies change
- Conducts research on assigned topics
- Evaluates importance of change

PERFORMANCE OBJECTIVES:

- The student will identify major innovations in air travel.
- The student will analyze the importance of innovations.
- The student will report on innovations studied.

MATERIALS:

Encyclopedia
NASA/Aircraft Materials (if available)
Innovation Data Card
Aircraft Innovation Chart

PROCEDURE:

1. Ask the students how school has changed since they started. Generate a list of changes/innovations, and note that every industry changes as the technology that supports the industry improves.

2. Note that air travel is a classic example of continued innovation. Ask the students how airplanes have changed since the Wright brothers. List some of the changes, and ask when the innovation took place. Some examples of innovations are included on the Aircraft Innovation Chart.

3. Have the students, individually or in groups, research one or more of the aircraft forms listed and report back to the class on the innovations found. Have the students complete the Chart on aircraft innovations. Other changes/forms can be added.

AIRCRAFT INNOVATION CHART

FORM	DATE(S)	INNOVATION
Wright Flyer		
Curtiss June Bug		
Junkers J-1		
Lockheed Vega		
Douglas DC-3		
Ford Trimotor		
Boeing B-17		
Messerschmitt Me-163 (Komet)		
North American F100 Super Sabre		
DeHavilland Comet		
Boeing 747		
Stealth Bomber		
Corvair XFY-1		
Bell X-1		
Concorde		
V-2 Rocket		
Space Shuttle		
Graf Zepplin		

INNOVATION DATA CARD

Innovation: _____ Date _____

Person(s) Responsible _____

Nature of Innovation _____

_____

_____

Importance: _____

_____

Innovation: _____ Date _____

Person(s) Responsible _____

Nature of Innovation _____

_____

_____

Importance: _____

_____

BIBLIOGRAPHY

BIBLIOGRAPHY

ACADEMY OF MODEL AERONAUTICS
Director of Marketing
1810 Samuel Morse Drive
Reston, Virginia 22090

AEROSPACE EDUCATION SERVICES PROGRAM
NASA Lewis Research Center
21000 Brookpark Road
Cleveland, Ohio 44135

BEECHCRAFT AIRCRAFT CORPORATION
P.O. Box 85
Wichita, Kansas 67201-0085

CESSNA AIRCRAFT COMPANY
Supply Division
P.O. Box 1521
Wichita, Kansas 67201

ESTES INDUSTRIES HI-FLIER MANUFACTURING CO.
P.O. Box 227
Penrose, Colorado 81240

KENTUCKY AVIATION ASSOCIATION
Robert Riggs
P.O. Box 39
Frankfort, Kentucky 40602

NASAO CENTER FOR AVIATION RESEARCH & EDUCATION
8401 Colesville Road
Ste. 505A
Silver Spring, Maryland 20910

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
300 North Cordell
Oklahoma State University
Stillwell, Oklahoma 74078-0422

NASA
Langley Research Center
TWS Bld. 1206
M/F: L93681 C
Hampton, Virginia 23665-5225

NATIONAL AUDIOVISUAL CENTER
8700 Edgeworth Drive
Capitol Heights, Maryland 20743-3701

NATIONAL HEADQUARTERS CIVIL AIR PATROL
United States Air Force Auxiliary
Director of Educational Programs
DCS, Aerospace Education
Maxwell Air Force Base, Alabama 36112-5572

THE NINETY-NINES, INC.
International Women Pilots
P.O. Box 59965
Will Rogers Airport
Oklahoma City, Oklahoma 73159

SAINT LOUIS UNIVERSITY PARKS COLLEGE
Cahokia
Illinois 62206

SMITHSONIAN INSTITUTION
National Air and Space Museum
Office of Education P-700
Washington, D.C. 20560

U.S. DEPARTMENT OF TRANSPORTATION
Federal Aviation Administration
Director of Aviation Education
Office of Public Affairs
800 Independence Ave., S.W.
Washington, D.C. 20591

APPENDIX

March 1991

Information from General Aviation Manufacturers Association

Suite 801
1400 K Street NW
Washington, DC 20005
(202) 393-1500

AVIATION EDUCATION RESOURCES

Academy of Model Aeronautics
1810 Samuel Morse Drive
Reston, VA 22090
703-435-0750
Provides information on building and flying model aircraft.

Aerospace Industries Association of America (AIA)
1250 Eye Street, NW
Washington, DC 20005
202-371-8400
Provides information on aerospace manufacturing, including aircraft, missiles, spacecraft, helicopters and related equipment.

Air Line Pilots Association (ALPA)
535 Herndon Parkway
Herndon, VA 22070
703-689-2270
Provides educational, safety, and pilot career information.

Air Traffic Control Association (ATCA)
220 North 14th Street, Suite 410
Arlington, VA 22201
703-522-5717
Provides information on national air traffic control.

Air Transport Association of America (ATA)
1709 New York Avenue, NW
Washington, DC 20006
202-626-4000
Provides information concerning the scheduled airline industry.

Aircraft Electronics Association (AEA)
P.O. Box 1981
Independence, MO 64055
816-373-6565
Provides information on installation of avionics.

Aircraft Owners and Pilots Association (AOPA)
421 Aviation Way
Frederick, MD 21701
301-695-2000
Provides information on general aviation from the pilot's perspective, careers, regulations, safety, and value of community airports.

American Institute of Aeronautics & Astronautics
370 L'Enfant Promenade, SW
Washington, DC 20024
202-646-7400
Promotes aeronautics and astronautics through educational material.

Aviation and Space Education Newsletter
1000 Connecticut Ave, NW, Suite 9
Washington, DC 20036
202-822-4600
Monthly newsletter profiles person, programs, students, and teachers who are making an impact in aviation education.

Aviation Distributors & Manufacturers Assoc. (ADMA)
1900 Arch Street
Philadelphia, PA 19103
215-564-3484
Provides information on aviation products, distributors and careers.

Aviation Exploring Division - Boy Scouts of America
National Office
1325 Walnut Hill Lane
Irving, TX 75038-3096
214-580-2427
Provides information on national BSA aviation exploring program.

Aviation Maintenance Foundation Inc. (AMFI)
Box 2826
Redmond, WA 98073
206-828-3917
Provides vocational guidance, books, and technical materials.

Aviation Technical Education Council (ATEC)
229 South 4th Street
Steelton, PA 17113
717-939-0620
Provides information on aviation maintenance technician training.

Civil Air Patrol (CAP)
Building 714
Maxwell AFB, AL 36112-5572
205-293-6019
Provides aerospace education programs on regulations and safety. Trains youth ages 13-21 in volunteer Cadet program for safety patrol.

Embry-Riddle Aeronautical University
Teacher Resource Center, Aeronautical Science Dept.
Daytona Beach, FL 32114
904-239-6499
Permanent collection of developed aviation curricula.

Experimental Aircraft Association (EAA)
Wittman Field
Oshkosh, WI 54903-3086
414-426-4800
Provides information on sport and recreation aviation, aerobatics, and how to restore old planes. Sponsors Project School Flight.

Federal Aviation Administration (FAA)
Aviation Education, APA-100
800 Independence Avenue, SW
Washington, DC 20591
202-267-3465
Provides information on aviation education materials and films.

Future Aviation Professionals of America (FAPA)
4959 Massachusetts Blvd.
Atlanta, GA 30337
800-538-5627
Provides pilot and aviation career information.

General Aviation Manufacturers Association (GAMA)
1400 K Street NW, Suite 801
Washington, DC 20005
202-393-1500
Provides information on general aviation statistics, learning to fly, teaching units, and general information.

Helicopter Association International (HAI)
1619 Duke Street
Alexandria, VA 22314-3406
703-683-4646
Provides general information on helicopters.

International Air Transport Association (IATA)
2000 Peel Street
Montreal, PQ, Canada H3A 4R4
Provides information on air transportation. Deals with air traffic and safety regulations.

Jeppesen Sanderson
55 Inverness Drive East
Englewood, CO 80112-5498
303-799-9090
Provides aviation education materials in the form of textbooks, videos, overheads and classroom support items.

National Aeronautics & Space Administration (NASA)
Educational Programs Office CODE XEE
400 Maryland Ave, SW
Washington, DC 20546
202-453-1000
Provides information on career and educational opportunities.

National Agricultural Aviation Association
115 D Street, SE, Suite 103
Washington, DC 20003
202-546-5722
Promotes interests of agricultural aviation through public education.

National Air & Space Museum
Office of Education
Washington, DC 20560
202-786-2106
Provides educational information on aviation and space activities.

National Air Transportation Association (NATA)
4226 King Street
Alexandria, VA 22302
703-845-9000
Provides information on airport service organizations (FBOs), air charter and flight training.

4-H Aerospace Education Program Leader
USDA Extension Service, Rm 3860 South Bldg.
Washington, DC 20250-0900
202-447-5516
Provides information on aerospace materials and state level 4-H aerospace program assistance.

National Association of State Aviation Officials
Metro Plaza One
8401 Colesville Road, Suite 505
Silver Spring, MD 20910
301-588-1286
Provides educational materials for all sectors of aviation.

National Business Aircraft Association, Inc, (NBAA)
1200 18th Street, NW
Washington, DC 20036
202-783-9000
Promotes aviation related interests of businesses, companies & individuals using aircraft for business.

National Intercollegiate Flying Association (NIFA)
Box 3207
Delta State University
Cleveland, MS 38733
601-846-4205
Promotes collegiate aviation education and safety.

National Transportation Safety Board (NTSB)
Office of Public Affairs
800 Independence Avenue, SW
Washington, DC 20591
202-382-6500
Provides information on air traffic safety.

The Ninety-Nines, Inc.
Box 59965, Will Rogers World Airport
Oklahoma City, OK 73159
405-685-7969
Contributors to educational, charitable and scientific activities.

Professional Aviation Maintenance Assoc. (PAMA)
500 NW Plaza, Suite 809
St. Ann, MO 63074
314-739-2580
Educational materials on professional aircraft mechanics.

Soaring Society of America, Inc.
P.O. Box E
Hobbs, NM 88241
505-392-1177
Provides information on soaring and gliding.

University Aviation Association (UAA)
3410 Skyway Drive
Opelika, AL 36801
205-844-2434
Provides information on college level aviation curricula and schools.

Young Astronaut Council (YAC)
1211 Connecticut Ave, NW, Suite 800
Washington, DC 20036
202-682-1984
Provides educational packets to YAC chapters nationwide.

Beech Aircraft Corporation
P O Box 85
Wichita KS 67201-0085 USA

316 681 7111
Telex 71 203603

Beechcraft
A Raytheon Company

SELECTED ELEMENTARY TEACHER RESOURCES 1989

Beech Aircraft Corporation
Aviation Education
Department 95
9709 East Central
Wichita, Kansas 67201

- Teacher's Free Packet (A collection of pictures and information about the Beechcraft product line.)
- Teacher's Workbook (Enrichment material organized by aviation subjects including exercises and teaching strategies.) $5.00
- Teacher Packet on Beech History (Covers the history of general aviation related to Beech airplanes.)

Cessna Aircraft Company
Air Age Education Department
P.O. Box 1521
Wichita, Kansas 67201

- International Air Age Education Packet (Includes 6 posters and teacher's guide.) $2.00
- Order Form (Listing current available booklets, charts, and teacher aids.)

General Aviation Manufacturers Association
1400 K Street NW, Suite 801
Washington, DC 20005

- General Aviation Activities and Resources (Material developed to assist teachers in constructing a unit on general aviation history and its modern application.)
- Learning to Fly (A booklet describing the training required for pilot certificates, answering questions, and illustrating basics of flight.)
- Aviation Education Resource List (List of aviation organizations providing materials to educators.)

Civil Air Patrol
Maxwell AFB, Alabama 36112-5572

- Teaching Materials Pamphlet
(Listing of available elementary aerospace education kits, packets and booklets for teacher use.)

Federal Aviation Administration
Office of Public Affairs
Aviation Education Program (APA-100)
800 Independence Avenue, SW
Washington, DC 20591

- FAA Aviation Education Programs and Materials Booklet
(Lists elementary level pamphlets, teacher guides, demonstration aids and regional FAA contacts in aviation education.)

Wayne Teague
State Superintendent of Education
Department of Education
State Office Building
Montgomery, Alabama 36130

- Aerospace Curriculum Guide (K-3)
Bulletin 1988, No. 65
Single Copies Free

Dr. David Housel
Oakland University
Rochester, Michigan 48309-4401

- Come Fly With Me! Book 1 (K-6)

- Come Fly With Me! Book 2 (7-9)
(Graded lesson units based on single to complex science teaching activities using aviation/aerospace concepts.) $10.00 per copy

Beech Aircraft Corporation
PO Box 85
Wichita, KS 67201-0085
USA

316 676 7111
Telex 203603 Beech UR

Beechcraft
A Raytheon Company

AEROSPACE EDUCATION VIDEO SOURCES

America's Achievements in Space Series	Two 90-minute video tapes every other month. $29.95 per tape The Eustin Press 47 Richards Avenue Norwalk, CT 06857 (800) 424-3800
Aviation Week Video Club	Selection of Aviation and Aerospace subjects. $29.95 per tape Aviation Week Video Club McGraw-Hill Aerospace and Defense Group P.O. Box 308 Mt. Olive, NJ 07828 (800) 433-0880
ABC Wide World of Flying Video Magazine	Four 90-minute videos at the rate of one every three months. $99.95 per year ABC Wide World of Flying P.O. Box 1719 Riverton, NJ 08077-9719 (800) 999-8783
Flight and Space Films and Videos	Selected historical and current subjects. Also available are Space Science NOVA Programs. Rental and purchase costs vary from $40. Coronet/MTI Film and Video 108 Wilmot Road Deerfield, IL 60015-5196 (800) 621-2131

Air Combat Series	Series of 13 - 50 minute video tapes. Initial tape entitled "War Aces" offered for $4.95 - others $29.95 plus $2.50. Air Combat P.O. Box 5079 Clifton, NJ 07015
CNN Science & Technology Week (Saturday and Sunday Cable Casts)	Video link for both science and news as well as teacher guides available weekly. Call (404) 939-4596 for sign up sheets and on-line information.

NASA and NASM Resource Centers

Teacher Resource Centers have been established to provide educators with NASA-related educational materials for use in the classroom. The materials include NASA publications, lesson plans, teacher guides, filmstrips, computer software, and audio cassettes, video tapes, 35-mm slides, and other reference materials.

Please contact the nearest Teacher Resource Center for further information.

NASA Ames Research Center
ATTN: Teacher Resource Center
Mail Stop 204-7
Moffett Field, CA 94035

NASA Goddard Space Flight Center
ATTN: Teacher Resource Laboratory
Mail Code 130.3
Greenbelt, MD 20771

NASA Jet Propulsion Laboratory
ATTN: Teacher Resource Center
JPL Education Outreach
Mail Stop CS-530
Pasadena, CA 91109

NASA Johnson Space Center
ATTN: Teacher Resource Room
Mail Stop AP-4
Houston, TX 77058

NASA Kennedy Space Center
ATTN: Educator Resource Library
Mail Stop ERL
Kennedy Space Center, FL 32899

NASA Langley Research Center
ATTN: Teacher Resource Center
Mail Stop 146
Hampton, VA 23665-5225

NASA Lewis Research Center
ATTN: Teacher Resource Center
Mail Stop 8-1
Cleveland, OH 44135

NASA Marshall Space Flight Center
ATTN: Teacher Resource Room
The Space & Rocket Center
Tranquility Base
Huntsville, AL 35807-0680

NASA National Space Technology Laboratories
ATTN: Teacher Resource Center
Building 1200
NSTL, MS 39529

The Education Resource Center of the National Air and Space Museum in Washington, D.C., is open to educators on a walk-in or through-the-mail basis. An extensive collection of videos, computer software, slides, audio cassettes, and written materials are available for review and duplication.

Contact:
The Education Resource Center
Office of Education P-700
National Air and Space Museum
Smithsonian Institution
Washington, D.C. 20560
202/786-2109